CLAIMS

1. A NOR element of a design having the cathodes of two or more field emission type microfabricated electron emitters connected in parallel with a low potential power source or ground, two or more anodes corresponding to said emitters connected in parallel to a high potential power source through a passive element or an active element, the two or more anodes being substantially at the same potential, and gate electrodes corresponding to said emitters to be input two or more signal voltages, wherein the potential of said anodes is lowered by electron emission from the emitters when a high potential input signal is input to either of the two signals.

2. The NOR element according to claim 1 wherein the anodes respectively corresponding to said two or more field emission type microfabricated electron emitters are constructed in a single plane.

3. The NOR element according to claim 1 or 2, being operated at a voltage of no more than 10 V.

4. A NAND element wherein an anode of a first field emission type microfabricated electron emitter and a cathode of a second field emission type microfabricated electron emitter are connected in series and two signal voltages are applied to gate electrodes corresponding to the first emitter and the second emitter so that the anode potential of the second emitter is lowered when the two input signals are high potential.

5. The NAND element according to claim 4 wherein a cathode of the first field emission type microfabricated electron emitter and the cathode of the second field emission type microfabricated electron emitter are in the same plane, and the anode of the first emitter and the cathode of the second emitter are connected in series by a pillar-shaped

electrode formed perpendicularly between the first emitter and the second emitter.

6. The NAND element according to claim 4 wherein the anode of the first field emission type microfabricated electron emitter and the cathode of the second field emission type microfabricated electron emitter are connected in series in an integrated fashion.

7. The NAND element according to any of claims 4 to 6 wherein there is no overlapping area when the anode of said first field emission type microfabricated electron emitter and the gate electrode of said NAND element are projected on an element plane.

8. The NAND element according to any of claims 4 to 7, being operated at a voltage of no more than 10 V.

9. A logical operation circuit including the NOR element of any of claims 1 to 3 and/or the NAND element of any of claims 4 to 8 as a logical operation element.

10. The logical operation element according to claim 9, including a NOT element as a logical operation element wherein an anode potential of an output is changed by a potential that is input to the gate, by connecting the cathode of the field emission type microfabricated electron emitter with the low potential power source or ground, and connecting the anode thereof with the high potential power source through the passive element or active element.

11. The logical operation circuit according to claim 9 or 10, comprising the NOT element and the NOR element, cathodes of their emitters being connected at the same potential to connect logical operation.

12. The logical operation circuit according to any of claims 9 to 11 wherein a logical operation is connected by connecting an output anode of each element with a gate of another element either through a passive element or directly.

13. The logical operation circuit according to any of

claims 9 to 12 wherein two adjacent field emission type microfabricated electron emitters have a design in which the anode of one emitter and the gate of the other emitter are in the same plane, a design in which the anode of one emitter and the cathode of the other emitter are in the same plane, or a design combining said two designs.

14. The logical operation circuit according to any of claims 9 to 13 wherein the cathodes, gates and anodes are in the same substrate plane and electrons are emitted in a direction parallel with the substrate surface.

15. The logical operation circuit according to any of claims 9 to 14 wherein a non-doped semiconductor substrate is employed as the substrate of said elements, and the emitters are electrically isolated by providing a conductive doped region solely at a projection of the emitters or at a periphery thereof.

16. The logical operation circuit according to any of claims 9 to 15 wherein an insulating layer of said elements comprises a material having a relative permittivity smaller than 4.

17. The logical operation circuit according to any of claims 9 to 16 wherein the cathodes of said elements are diamond or a conductive material covered with a thin film of diamond.

18. The logical operation circuit according to any of claims 9 to 16 wherein the cathodes of said elements are carbon nanotubes or a conductive material covered with carbon nanotubes.

19. The logical operation circuit according to any of claims 9 to 16 wherein the cathodes of said elements are BN, AlN or GaN or a conductive material covered with a thin film of these.

20. The logical operation circuit according to any of claims 9 to 19 wherein said elements are operated at a

voltage of no more than 10 V.